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The Mad Hatter Mercury Mystery

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"I'm investigating things that begin with the letter "M", said Lewis Carroll's Mad Hatter. This Mad Hatter, from the children's tale Alice in Wonderland, gave a tea party in a surreal environment. Such disorientation has a firm footing in reality, however. Hatmakers over the past three centuries used mercury in their work, and some hatters experienced nervous disorders, odd behavior, and even symptoms of madness. But why were the hatters mad? Did the brim curlers sniff glue? No, what they sniffed was mercury.

But the story doesn't end there. Mercury left from the hat industry, before its use was banned in the 1940's, has left a legacy still with us today in some parts of Connecticut.



[Johan Varekamp, Ph.D.](#)

[Johan Varekamp](#), George I. Seney Professor of Earth and Environmental Sciences, has followed Carroll's Hatter's example by investigating mercury. When he and his students at [Wesleyan University](#) investigated cores of sediments taken at the mouth of the Housatonic River in western Connecticut, they found high levels of mercury. The source was a mystery. They traced the mercury back up the river by doing more sampling, finding ever higher concentrations, until they reached the source: the Still River in Danbury. They were initially surprised to find such high concentrations (less than the State identifies as dangerous, but close enough to cause concern should the mercury become concentrated.)

What could have happened nearby, they wondered, to cause the phenomenon?

The Hat City's Past

[Danbury](#) Connecticut has always been known as "The Hat City". It was the hat making capital of the

world in the 19th century. At first the felt fur hats were made by hand in small shops. During the 1830's, more people were employed in hatmaking there than in any other trade. Some farmers were known to pull out a kettle, gather some furs, and hang up a hatter's shingle as a cottage industry in lean times.

European hatters brought their trade with them when they emigrated to North America. It became such a successful industry that in 1731, King George II banned exports of hats from the colonies to benefit hatters in England. The city of Danbury had all of the necessary prerequisites for a successful hatmaking industry: abundant water, transportation, animal furs, and plentiful labor.

Local legend says the first Danbury hatter might have been [Zoe Benedict](#). Wool felt was already made in many parts of the world. But Benedict found a new twist. Being a busy New England Yankee, when he got a hole in his shoe, he plugged it with a scrap of rabbit fur. Later he discovered that pressure and perspiration had transformed it into felt. He experimented with fur felt, shaping large pieces into hats on his bedpost. His shop opened on Main Street in 1780, making beaver hats at the rate of three per day.

Business boomed, because everyone then wore hats! Hats were indicators of gender, occupation, social status, season, interests, and personality. Abraham Lincoln's famous stovepipe hats were made of beaver felt, and may have been made in Danbury. Hatmaking spread to a smaller degree to other towns in the state. Danbury was burned by British troops in 1777, during the American Revolutionary War, but another revolution, this time Industrial, brought hatmaking back with a vengeance. With mechanization, factories sprang up.

At the peak of the industry, five million hats a year were produced in 56 different factories in Danbury. A process called "carroting" was used in the production, but it had nothing to do with vegetables. Carroting involved washing animal furs with an orange-colored solution containing a mercury compound, mercury nitrate.

The colorful solution facilitated the separation of the fur from the pelt and made it mat together smoothly. The fur was then shaped into large cones, then shrunk in boiling water and dried many times before final shaping, smoothing, and finishing. Workers would often be exposed to mercury vapors in the steamy air. Many hatters with long-term exposure, particularly those involved in carroting, got mercury poisoning.

Mercury poisoning attacks the nervous system, causing drooling, hair loss, uncontrollable muscle twitching, a lurching gait, and difficulties in talking and thinking clearly. Stumbling about in a confused state with slurred speech and trembling hands, affected hatters were sometimes mistaken for drunks. The ailment became known as ³The Danbury Shakes². In very severe cases, they experienced hallucinations.

"Mad as a hatter" became a common term for someone experiencing severe mental problems. Some hatters eventually died of mercury poisoning. In 1934, following intense objections from hatters¹ labor unions, a major scientific study was performed and documented mercury poisoning in hatters. Processes to mat felt that did not include mercury were developed, and by 1943 all use of mercury in hatmaking ceased. Processes to mat felt that didn't include mercury were developed.



"Sea of Hats", circa 1919, courtesy of the [Danbury Historical Society](#).

From 1950 to 1960, hats declined in fashion as styles changed, and remaining factories began to move to other locations. The late President John F. Kennedy is thought to have contributed to the decline of hat wearing, as the "first hatless U.S. President" although the First Lady certainly did her part to promote the pillbox style. One of the last big factories to leave Danbury was the Mallory Factory, which had its heyday in the mid-1800's. By 1960, though, it had combined with several other large manufacturers: Lee, Stetson, and Disney. (Stetson was and still is well known for making State Troopers' hats, and Disney --well, you know.) Thus, the hats are gone (though they say you can still find the old beauties at yard sales and flea markets in the area).

The Legacy Lives On

Unfortunately, a hazardous legacy remains. After learning about the Danbury hatmaking history, Varekamp sampled surface mud surrounding the former Mallory Factory, and found very high mercury levels still there-67,000 parts per billion (ppb), compared to a state cleanup standard of 20,000 ppb.) A nearby park where children play had levels of 25,000 ppb. Typical levels elsewhere are around 400-600 ppb. Much of the mercury has found its way to the nearest rivers, particularly the Still River, where it can accumulate in fish.

The mercury has dissipated and sunk into the sediments, but the Still and Housatonic Rivers are both prone to catastrophic flooding. Varekamp says severe storms such as the memorable hurricanes of 1938 and 1955 stir up river sediments, remobilizing buried contaminants. The sediments and their mercury burden can be transported into Long Island Sound. "It's only a matter of time before another major hurricane happens, and flushes out more mercury." Varekamp says. Varekamp's research is funded by [Connecticut Sea Grant](#) and the Connecticut Department of Environmental Protection.

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